FARMERS' BULLETIN-1168
UNITED STATES DEPARTMENT OF AGRICULTURE

VARIETIES OF WINTER WHEAT ADAPTED TO THE EASTERN UNITED STATES

THE PROFITABLE PRODUCTION of wheat in the eastern half of the United States depends to a considerable extent on the choice of the best adapted varieties. In general, the soft red winter wheats are grown, although soft white wheats are popular in the northeastern United States, especially in New York and Pennsylvania. In the extreme western portion of the area discussed in this bulletin, which is limited on the west approximately by the line of 30-inch rainfall, hard red winter wheats of the Turkey type are grown. Along the line of 30-inch rainfall there is a transition zone in which hard red and soft red winter wheats succeed about equally well. This is especially true of eastern Oklahoma and eastern Kansas.

The leading varieties of hard red winter wheat are the Turkey, Crimean, Kanred, Kharkof, and Malakof. These varieties are widely grown in the western half of the United States.

There are many varieties of soft red wheat, but the most important types are represented by the Fultz, Poole, Fulcaster, and Mediterranean.

The Dawson Golden Chaff and Gold Coin, under different names, are the most important white wheats.

Contribution from the Bureau of Plant Industry

WILLIAM A. TAYLOR, Chief

Washington, D. C. April, 1921

VARIETIES OF WINTER WHEAT ADAPTED TO THE EASTERN UNITED STATES.[1]

CLYDE E. LEIGHTY, *Agronomist in Charge of Eastern Wheat Investigations.*

CONTENTS.

THE GEOGRAPHIC REGION COVERED.

THIS BULLETIN deals principally with the soft red and soft white winter wheats adapted to the eastern half of the United States. It is necessary, however, in discussing the kinds of wheat grown in certain States in this section to deal to some extent with the hard red winter wheats and the spring wheats, as there are districts in which these types of wheat may be grown along with those previously mentioned. In other words, transition zones between the different wheat-growing districts exist, where either of two types of wheat may do about equally well.

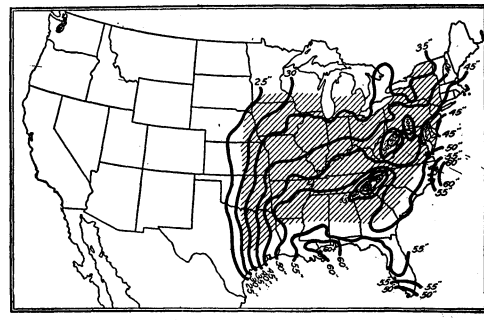

FIG. 1.—Outline map of the United States, showing by shaded lines that portion of the humid wheat region in which winter wheat is now grown. The boundaries are somewhat arbitrary, there being transition zones on the north and west. The average annual rainfall in inches is shown by the numbered lines.

The section of the United States under consideration (the shaded portion of fig. 1) comprises mainly the States east of Nebraska, Kansas, Oklahoma, and Texas and a small eastern portion of each of the four States mentioned. In nearly all of this area the average annual rainfall is at least 30 inches, and, although large seasonal variations occur, the area is generally considered as humid. The average annual rainfall in inches is shown by the numbered lines in figure 1.

[1] This Farmers' Bulletin supersedes No. 616, entitled "Winter-Wheat Varieties for the Eastern United States," issued in 1914.

Many varieties of wheat are being grown at the present time by the farmers of this part of the United States, and new varieties are continually being originated and distributed by public or private agencies. The same variety is often known by two or more names, however, and the number of distinct varieties is much smaller than the long list of varietal names would indicate. The number of distinct varieties, nevertheless, is large, although the characters which distinguish them are often minute and sometimes not related to the characters which make the varieties valuable. Careful study and considerable time are required in order to learn to recognize varieties, and comparative tests are necessary to determine their value.

TESTING VARIETIES OF WHEAT.

The testing of varieties of wheat has always been an important work of the State agricultural experiment stations and of the United States Department of Agriculture. In such tests usually a large number of varieties are grown under conditions as nearly alike as possible, for the purpose of determining the varieties best suited to local conditions.

It usually has been impossible, however, to find any one wheat which is always best for a given locality, as conditions of climate and soil cause fluctuations from season to season. About the best that can be hoped for is to determine several of the varieties which will do well on the average for several seasons. The variety which gives the best average yield is usually the one that should be grown, and not one that yields remarkably well, perhaps, in one season out of many, but whose average yield is low. The recommendations made in this bulletin are based principally upon the results of varietal experiments made by the State agricultural experiment stations or the agricultural colleges. The assistance given by the agronomists of the States concerned in furnishing these results is hereby gratefully acknowledged.

NORTHWARD ADVANCE OF WINTER WHEAT.

Since the introduction of the hardy varieties of wheat from southeastern Europe there has been a decided northward movement of the winter-wheat area. This movement has been rapid in recent years. The reasons therefor are the generally large yields of winter wheat, due (1) to its earlier maturity, thus enabling it to escape hail, hot winds, and disease; (2) to its greater drought resistance; and (3) to the better division of labor which it allows, through fall seeding and earlier harvesting.

The acreage of winter wheat in 1909 is shown in figure 2 and the same data for common spring wheat in figure 3.

The average yields in Iowa and Minnesota for 10 years (1909–1918) show an advantage of 4.2 and 3.1 bushels, respectively, in favor of winter wheat over spring wheat. With this evidence at hand it is seen that the region in which winter wheat is grown should be extended northward as rapidly as possible, making use of the hardy varieties and more hardy strains as these are developed, and that the spring varieties should be used only in cases where the fall-sown wheats are winterkilled or where winter-wheat growing has been found by trial to be unprofitable. Large acreages of winter wheat should not be sown in any locality, however, until it has been determined by tests lasting at least three years that the crop will succeed.

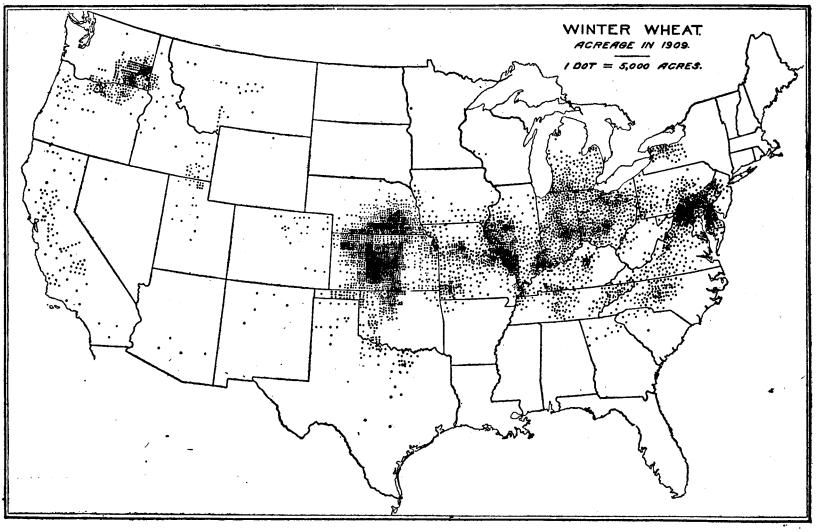

FIG. 2.—Outline map of the United States, showing the acreage of winter wheat grown in 1909. Each dot represents 5,000 acres. Each county having over 2,500 acres and not more than 7,500 acres has one dot, from 7,500 acres to 12,500 acres, two dots, etc.

TRANSITION ZONES IN WHEAT GROWING.

In northern Iowa and southern Minnesota there is a transition zone between the district which grows only winter wheat and the district which grows only spring wheat. In this zone both spring and winter wheats are grown, often on the same farm. This same condition exists in northeastern Nebraska.

In southern Iowa, southeastern Nebraska, eastern Kansas, central Oklahoma, and north-central Texas there is a similar transition zone, the two types of wheat being the hard red winter wheats of the Turkey type, that are better adapted westward, and the soft red winter wheats, that are better adapted eastward. This transition zone, generally speaking, is that region which has an average annual rainfall between 30 and 35 inches.

HARD RED WINTER WHEAT.

The hard red winter wheats are of the Turkey or Crimean type, represented principally by the Turkey, Crimean, Kanred, Kharkof, and Malakof varieties. All of these are usually adapted to localities in which the Turkey variety succeeds. The Kharkof is generally considered to be more hardy than the Turkey variety and consequently better adapted than the latter to northern localities, especially in the northern parts of Illinois, Iowa, and Nebraska and the southern parts of Minnesota and Wisconsin. Certain selected strains of the Turkey wheat seem to be, however, equally as hardy as the

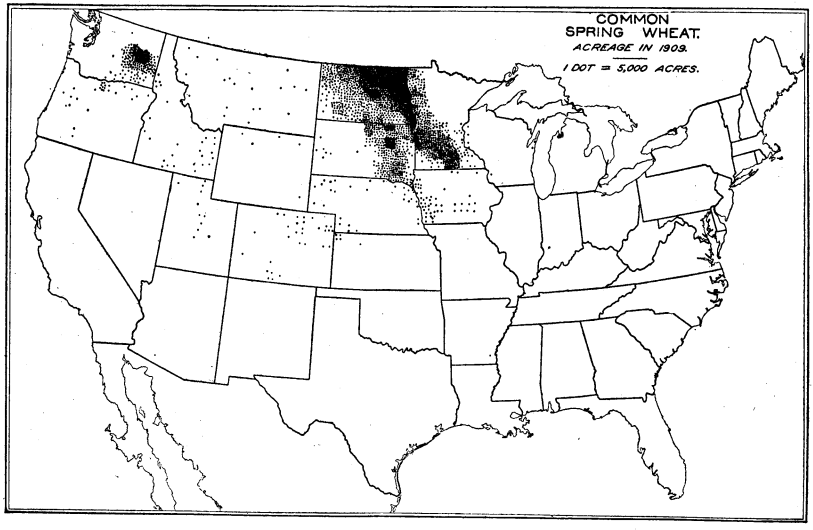

FIG. 3.—Outline map of the United States, showing the acreage of common spring wheat grown in 1909. Each dot represents 5,000 acres. Each county having over 2,500 acres and not more than 7,500 acres has one dot, from 7,500 acres to 12,500 acres, two dots, etc.

Kharkof. There are also strains of these hard wheats, selected at several State experiment stations, which yield much better than the unselected seed commonly grown. The Kanred, developed at the Kansas Agricultural Experiment Station, is one of the best of these.

SOFT RED WINTER WHEAT.

Soft red winter wheat is sown in all that part of the United States east and south of the transition zone already described where wheat is grown, except those parts of the North Atlantic and New England States where white wheat or spring wheat is grown. This region is sometimes divided into northern and southern sections; but this division is based upon climatic conditions, as the grain produced in the Southern States is not markedly different from that produced in the Northern States.

For convenience of reference only, the States producing red winter wheat will be grouped under the following heads:

(1) The southern section west of the Mississippi River, which includes eastern Oklahoma, Arkansas, Texas, and Louisiana.

(2) The southern section east of the Mississippi River, which includes Tennessee and North Carolina and the States southward.

(3) The North-Central States, which include Kentucky and the States northward; also Missouri and part of Kansas.

(4) The North Atlantic States, which include Virginia and the States northward.

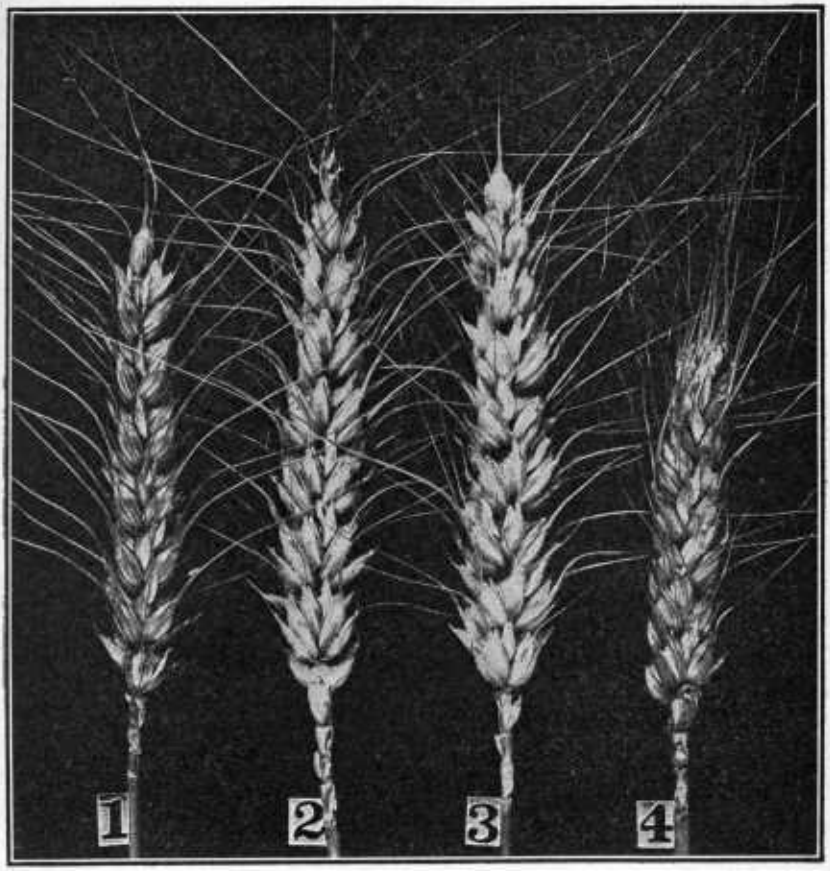

FIG. 4.—Heads of bearded winter wheat, representative of the following groups: 1, Mediterranean (group 6); 2, Virginia (group 7); 3, Bearded Winter Fife (group 13); 4, Early Genesee Giant (group 12).

ADAPTED VARIETIES OF SOFT RED WINTER WHEAT.

WHEAT IN THE SOUTHERN SECTION WEST OF THE MISSISSIPPI RIVER.

Texas.—For the northern part of Texas, extending southward three or four tiers of counties from the Red River, where the annual rainfall amounts to about 30 inches or more, bearded wheats of the Mediterranean type (fig. 4) are commonly grown and give on the

average better results than the Turkey wheats. In addition to the Mediterranean variety, the Fulcaster and the Ironclad are varieties of soft red bearded wheats commonly grown, while the Poole, Michigan Amber, and German Emperor (all very similar to each other) are good soft red beardless wheats. The area to the west, where the rainfall is less than about 30 inches annually, is included in the hard winter-wheat district, and the Turkey and Kharkof varieties are more certain to produce a good crop. Wheat is not successfully grown on the sandy coastal plains of Texas.

Louisiana.—Wheat has generally failed when grown for grain in Louisiana, and it can not be recommended. On the red lands of northern Louisiana, however, wheat is one of the best winter grazing crops and in favorable seasons may produce a profitable yield of grain. As it fits well in systematic rotations, wheat may often be grown profitably in Louisiana for pasture and feed. The following varieties of soft red winter wheat are reported as having yielded well: Fultz, Red May, Harvest King, Fulcaster, and Purple Straw. Of these varieties the Fulcaster is bearded, while the others are beardless.

Arkansas.—Conditions for wheat growing in southern Arkansas are similar to those of northern Louisiana. On the high lands of the northern part, however, wheat may be more successfully grown. The varieties giving the best results are the Alabama Bluestem, Red May, Purple Straw, and Fultz, all beardless varieties, and the Fulcaster and Stoner[2] (or Marvelous), bearded varieties.

Oklahoma.—There are two distinct wheat belts in Oklahoma. The western portion, which is the main wheat section, is in the hard red winter-wheat belt, while the eastern portion is in the soft red winter-wheat belt. The division line lies about midway between the lines of 30 and 35 inch average annual rainfall (see fig. 1) and coincides roughly with the 1,000-foot elevation line. A line drawn from Newkirk in the north to Waurika in the south divides the State approximately into the two portions. Along this line both hard and soft wheat varieties succeed about equally well on the average, although one or the other may be favored by seasonal conditions.

The hard wheats adapted to the western portion are the Turkey, Kharkof, and Kanred, all bearded. The Kanred has led in yield in recent varietal experiments. The soft red wheats adapted to the eastern portion are the Sibley New Golden, Fulcaster, Missouri Bluestem, and Mediterranean (all bearded varieties), and the Fultz and Early Red Clawson (beardless varieties).

[2] This variety is known by various other names, among which are Miracle and One-Peck-to-the-Acre. Extravagant and misleading claims have been made for it, concerning which detailed data are given in Department Bulletin 357. It should be sown at the rate per acre commonly used for wheat and not at reduced rates.

WHEAT IN THE SOUTHERN SECTION EAST OF THE MISSISSIPPI RIVER.

Mississippi, Alabama, Georgia, and South Carolina.—Wheat is more successfully grown on clay or loam than on sandy soil; consequently it is not grown to any large extent in the southern parts of these States, but is principally confined to the Piedmont region. Preference should be given to good locally grown seed of a strain or variety that is known to produce good results.

A beardless, white-chaffed, red-grained variety known in different localities as Alabama Bluestem, Georgia Bluestem, Alabama Red, Georgia Red, or Purple Straw is generally one of the best yielding wheats in these States. Other good beardless varieties of wide adaptation are the Red May, Fultz, and Leap Prolific. Bearded wheats usually producing good yields are the Red Wonder, Fulcaster, and Dietz Mediterranean. There is little, if any, difference between the wheats to which these three names are applied.

Florida.—Wheat is seldom grown in Florida and can not be recommended as a crop for that State. Occasionally it produces a fair yield of grain, but it is not a sure crop and can not compete with other crops.

Tennessee.—Much of Tennessee is fairly well suited to wheat growing, the yields and quality of grain being good. The Fulcaster, Poole, Fultz, and Fultzo-Mediterranean (known also as Economy, New Columbia, Squarehead, and Four-Rowed Fultz) varieties are recommended. All of these are beardless except the Fulcaster, which is bearded. With the Fulcaster may be included the Stoner or Marvelous[3] variety. Other red-grained varieties that have done especially well in comparative experiments are the Kansas Mortgage Lifter, Dietz, Mediterranean, and Valley (all bearded) and the Currell Prolific, Red Russian, Harvest King, and Red Prolific, beardless sorts. The Fultzo-Mediterranean has stiff straw and is therefore recommended for rich land where other varieties may lodge.

North Carolina.—The Piedmont and mountain sections of North Carolina are suited to wheat growing. The Purple Straw, Leap Prolific, Red May, and Fultz (beardless varieties, fig. 5), and the Fulcaster, Lancaster, Dietz, and Red Wonder (bearded varieties) are some of the well-known sorts which have given good yields in this State.

WHEAT IN THE NORTH-CENTRAL STATES.

Eastern Kansas.—The soft or semihard wheats, known commercially as soft red winter wheat, are best for growing in a section of eastern Kansas. This section can not be limited exactly, but may be said to include the eastern tier of counties at the north and, grad-

[3] See the footnote on page 8.

ually increasing toward the south, to include the four eastern tiers on the southern border. The line of division is not far from the 35-inch rainfall line shown in figure 1. In a section west of this, including one or two tiers of counties across the State and approaching well toward the 30-inch rainfall line, soft red and hard red wheats do about equally well. This is the transition zone between these two types of wheat, as the hard wheats of the Turkey type undoubtedly are better west of this zone.

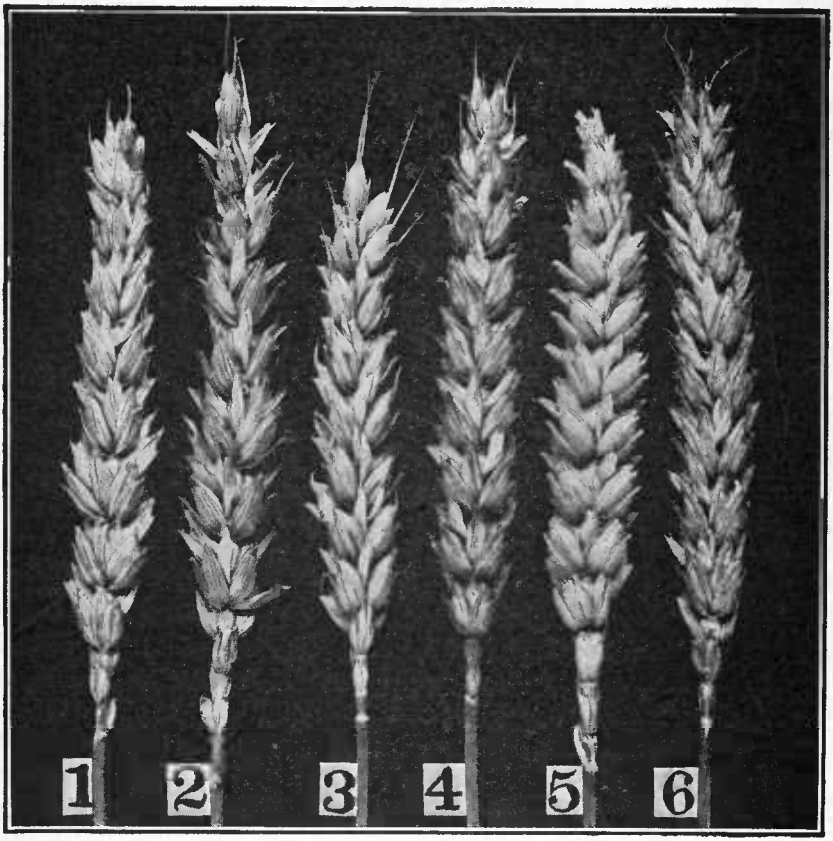

FIG. 5.—Heads of beardless winter wheat, representative of the following groups: 1, Fultz (group 1); 2, Leap Prolific (group 1); 3, Purple Straw (group 1); 4, Poole (group 2); 5, Mealy (group 3); 6, Dawson Golden Chaff (group 10).

The Fulcaster variety has produced the highest yields in experiments conducted in southeastern and northeastern Kansas to determine the best varieties of wheat. In northeastern Kansas the Harvest Queen has yielded nearly as well as the Fulcaster and is more winter hardy. It also has a stiff straw and stands up well on rich soil. The Harvest Queen is beardless and is therefore given preference by many farmers over the Fulcaster, which is bearded.

The Fultz and Zimmerman, beardless white-chaffed varieties, are often grown in the soft-wheat belt of eastern Kansas. Both are early maturing, the Zimmerman being especially early. In certain seasons and on some soils where earliness is an advantage, these varieties are better than the later maturing ones.

The Currell, a beardless red-chaffed variety, is especially well suited to wet lands in southeastern Kansas. It has a rather stiff straw and stands up well after ripening.

In the transition zone mentioned above and westward, the Kanred, a new variety of hard winter wheat developed at the Kansas Agricultural Experiment Station, appears to be superior to the older varieties, Turkey and Kharkof, which hitherto have been generally grown.

Missouri.—Extensive varietal experiments made by the Missouri Agricultural Experiment Station in recent years, in cooperation with the United States Department of Agriculture, indicate that the bearded varieties, Fulcaster, Dietz (Fulcaster and Dietz are practically identical), Mediterranean, and Lebanon, and the beardless varieties, Poole, Michigan Wonder, Red Wave, Beechwood, Early Ripe (these last-named five varieties are similar), Hickman, and Fultz (Hickman and Fultz are practically identical), are well adapted for growing in that State. The hard red winter wheats, Kanred, Turkey, and Kharkof, are about equal to the soft red varieties named above in the extreme northwestern corner of the State.

Illinois.—The hard red wheats are best adapted to central and northern Illinois. The Kharkof seems best adapted to the extreme northern part, while the Kharkof, Turkey, Malakof, and Beloglina are all adapted to the remainder of this section.

The soft red wheats are best adapted to southern Illinois. The following varieties are among the best for this part of the State: Fulcaster and Rudy (bearded varieties), and Harvest King, Wheedling, Fultz, and Poole (beardless varieties).

Kentucky.—The Fultz has not been surpassed in yield by any variety tested at the Kentucky Agricultural Experiment Station, and it is probably the equal of any variety for the bluegrass section of the State. A strain of this wheat isolated and tested at the Kentucky station has been found better than the original variety, and this will soon be distributed over the State. The Fultzo-Mediterranean (also known as Square-Head, Four-Rowed Fultz, and Economy), because of its stiff straw, is suited to very rich land, especially bottom land. The Currell Prolific and the similar varieties Poole and Harvest King are considered by farmers as best in western Kentucky.

Of the bearded wheats the Fulcaster is a high yielder and produces grain of excellent quality. The Kansas Mortgage Lifter and Marvelous are practically identical with the Fulcaster.

Indiana.—Extensive experiments conducted by the Purdue University Agricultural Experiment Station indicate that the Michigan Amber, Harvest King, Rudy, Farmers Friend, and the better strains of Fultz and Poole are well adapted to the greater part of the State. The Turkey is a good variety for the black soils of the northwestern section of Indiana. The Red Wave is a good yielder in certain sections, but as a rule is not of good milling quality. These are all red wheats. The Rudy, Farmers Friend, and Turkey are bearded varieties, while the others mentioned are all beardless. In some sections the Red Rock (bearded) is finding favor. Several other varieties are to be found in the State. The varieties named are among the best and most widely distributed, however, and may be safely recommended.

Ohio.—In a 20-year varietal experiment at the Ohio Agricultural Experiment Station the Dawson Golden Chaff has led in yield by slightly more than a bushel per acre. This wheat, it must be remembered, however, is not a red but an amber or white grained wheat. Red wheats following closely in yield are Harvest King, Nigger, Poole, Mealy, and Valley. In the past 10 years a number of new varieties of red wheat originated by selection at this station have been included. The white wheats Dawson Golden Chaff and Gold Coin have again led in yield, but by less than a bushel per acre. In this 10-year experiment the highest yielding red wheats are the Gladden (a selection of Gipsy), Portage (a selection of Poole), Trumbull (a selection of Fultz), Harvest King, Red Wave, Poole, and Nigger. Tests made in different parts of the State indicate that the selections named above are widely adapted. The Gladden, Nigger, and Valley are bearded; the others are beardless.

Michigan.—The Red Rock (bearded, red grained, red chaffed) is the most widely grown variety in Michigan. It was developed at the Michigan Agricultural Experiment Station. When grown on good wheat land it produces grain of superior hardness and baking qualities. The Egyptian, Nigger, Shepherd Perfection, and Lancaster are old standard varieties which came through the trying winters of 1917 and 1918 in comparatively good shape.

Of the white wheats the American Banner is of the highest quality, but the Dawson Golden Chaff, Gold Coin, and Plymouth Rock are more widely grown.

Due to the increase in the milling of local wheats there is an increased demand for red wheats of superior hardness as compared to the softer red and white wheats.

In 1918 and 1919 the acreage of spring wheat was largely increased in Michigan. The Marquis variety has met with most widespread favor. Judging by the performance of this variety during the past two years a considerable acreage of spring wheat will figure permanently in many Michigan sections, particularly in the Thumb region, the upper part of the Lower Peninsula, and on land adapted to wheat on the Upper Peninsula.

WHEAT IN THE NORTH ATLANTIC STATES.

Virginia.—Varieties adapted to the western part of Virginia are the Fulcaster, Stoner, Red Wonder, Blue Ridge, and Mediterranean (bearded varieties), and the Fultz, Harvest King, Leap Prolific, and Perfection (beardless varieties). The bearded varieties have yielded better than the beardless ones. For the northern and eastern parts of the State tests at the Arlington Farm, near Washington, D. C., indicate that the following varieties are all well adapted: Purple Straw, Fultz, Poole, Leap Prolific, Currell, and China. All of these are beardless varieties. The bearded varieties, Dietz, Bearded Purple Straw, and Mammoth Red (all similar), while especially good in some seasons, have not produced as high average yields as the beardless sorts.

West Virginia.—Gipsy, Nigger, and Rudy (bearded, red-grained varieties), Poole (beardless red grained), and Dawson Golden Chaff (beardless white grained) are good varieties for growing in this State.

Maryland.—The following varieties of wheat are adapted to Maryland: China and Currell Prolific (beardless red wheats), Bearded Purple Straw, Dietz Longberry, Turkish Amber, Mammoth Red, and Fulcaster (bearded red wheats), and Dawson Golden Chaff (a beardless white wheat).

Delaware.—The wheats listed below are especially recommended for conditions in this State. They have yielded well in extensive experiments at the Delaware Agricultural Experiment Station and in the main have the characteristics desired by the farmer and by the miller.

The bearded varieties recommended are the Auburn Red, Dietz Amber, Farmers Trust, Gipsy, Lebanon, Mediterranean, Red Wonder, Reliable, Rudy, and Valley. The beardless varieties recommended are the California Red, Currell Prolific, Harvest King, Leap Prolific, and Poole.

New Jersey.—The Fultz, Currell Prolific, and China are good beardless red-grained wheats for New Jersey, and the Dawson Golden Chaff is an adapted beardless white-grained wheat. These varieties have been widely grown and have been found to yield well in nearly

every place where tried. The Leap Prolific is a good beardless red-grained wheat for the State for early sowing, but has not been found as satisfactory as some other varieties for late sowing. The Red Wave is also grown to some extent.

The Fulcaster, a bearded red-grained variety, is adapted to a wide range of soils in the State and is one of the surest wheats for northern New Jersey, as it also is for much of the eastern part of the United States. The straw is of medium stiffness, this variety being inferior in this respect to the Fultz, Currell Prolific, and China varieties.

Pennsylvania.—Varieties of red winter wheat adapted to Pennsylvania are the Currell Prolific, St. Louis Grand Prize, Poole, Red Wave, Harvest King, Reliable, Dietz Longberry, and Fulcaster. The last three mentioned are bearded; the others, beardless. Dawson Golden Chaff, a white wheat, gives excellent results in the State.

New York.—White wheats are most commonly grown in New York. Several of the red wheats, however, have yielded well in recent experiments. The Red Wave and Prosperity, beardless varieties, and the Gipsy and Fulcaster, bearded varieties, are recommended. Selections from these varieties developed in the breeding operations at Cornell University Agricultural Experiment Station in cooperation with the United States Department of Agriculture have outyielded the original varieties and are being distributed to farmers.

SOFT WHITE WINTER WHEAT.

The principal district growing soft white winter wheat comprises New York and Pennsylvania and portions of the States lying immediately south and east of them. White wheat is not the only kind grown in this district, red wheat being also largely grown in some parts. On the other hand, more or less white wheat is grown throughout the soft red winter wheat district, especially in Michigan and Ohio.

In New York and under similar conditions, speaking generally, white wheats yield more grain per acre, possess stronger straw, weigh a little less to the measured bushel, have slightly softer grains, and furnish a better pastry flour but a somewhat weaker bread flour than the red varieties.

DEMAND FOR SOFT WHITE WHEAT.

There is a considerable demand for soft white wheat in New York and adjoining States by manufacturers of whole-wheat foods and pastry flours. When the local supply is inadequate, this class of wheat is sometimes brought from the Pacific coast. There is also a large local demand for wheat as poultry feed in these States and

in New England, and the variety giving the largest yields of grain will probably be found most profitable where this demand exists, irrespective of the milling value of the wheat. Where white wheat yields best, therefore, and there is a good market for it, the growing of this type is recommended.

ADAPTED VARIETIES OF SOFT WHITE WINTER WHEAT.

The white wheats which have succeeded well in the North-Central and North Atlantic States are as follows:

Indiana.—Dawson Golden Chaff.

Michigan.—Early Windsor, Dawson Golden Chaff, American Banner.

Ohio, Virginia, West Virginia, Maryland, and New Jersey.—Dawson Golden Chaff.

Pennsylvania.—Dawson Golden Chaff, Gold Coin (or Fortyfold, Klondike, or Number 6).

New York.—Dawson Golden Chaff, Gold Coin (or Fortyfold, Klondike, or Number 6), Jones Longberry No. 1, Early Genesee Giant.

Dawson Golden Chaff is probably the leading variety of soft white winter wheat. It has been one of the highest yielding varieties among all the wheats tested in the States just mentioned. This variety stands up well in the field and is above the average in winter resistance. The grains are somewhat harder than those of most other white wheats. In several milling and baking tests that have been made it has given a good yield of flour, rather low in total protein content, but containing gluten of excellent quality.

Gold Coin wheat under one name or another, such as American Banner, Fortyfold, Klondike, Number 6, or Junior No. 6, is grown very widely in New York. It has a somewhat softer, whiter grain than the Dawson Golden Chaff variety, the head is somewhat more compact, and the straw is purple, while in the Dawson Golden Chaff it is yellow.

WHEAT IN THE NEW ENGLAND STATES.

The only States of this group for which wheat production is reported by the Bureau of Crop Estimates are Maine and Vermont. There was a marked increase in acreage and production in these two States from 1914 to 1918, but a decrease in 1919. In Maine the increase was from 3,000 acres in 1914 to 22,000 in 1918, with a decrease to 8,000 acres in 1919. The production in the three years was, in 1914, 81,000 bushels; in 1918, 484,000 bushels; in 1919, 150,000 bushels. In Vermont the area increased from 1,000 acres in 1914 to 19,000 in 1918 and decreased to 11,000 in 1919. The production in the three years was, in 1914, 29,000 bushels; in 1918, 418,000 bushels; in 1919, 176,000 bushels.

Spring wheat is the only kind reported as being grown in the two States just mentioned. The adapted varieties are the Marquis, Fife, Bluestem, and Preston.

Experiments made by the Connecticut Agricultural Experiment Station at New Haven during the seasons of 1911–12 and 1912–13 with seed of 14 varieties of winter wheat furnished by the United States Department of Agriculture indicate that all of the varieties tested can be successfully grown in that locality. Although all these varieties were grown under adverse soil conditions, the average yield for the two years is above 18 bushels in every case. The six leading varieties in the order of yield are Dawson Golden Chaff, Fultzo-Mediterranean, Dietz, Bearded Winter Fife, Fultz, and Maryland Flint. The Dawson Golden Chaff yielded at the rate of 29 bushels per acre, while the other five varieties each yielded approximately 23 bushels per acre. It is probable that the Dawson Golden Chaff is one of the best-yielding winter varieties for the New England States.

There is a large local demand in New England for wheat as a poultry or stock feed. It should not be difficult for several farmers in almost every neighborhood to sell at a good price to their neighbors all the wheat which they can raise. The growing of wheat on land adapted to its culture is therefore likely to prove profitable in New England, and the farmers of this section would do well to consider carefully the addition of wheat to the crops which they grow. Winter wheat will doubtless produce better average yields, where it can be grown, than spring wheat if proper cultural methods are employed and suitable varieties are used.

THE IMPROVEMENT OF VARIETIES.

Many farmers are doubtless growing inferior varieties of wheat. The first concern of every grower should be to determine, by test or otherwise, the variety best suited to his conditions. Having determined this point, he should then begin and faithfully continue systematic efforts to improve this variety for the conditions of his farm. The method of improvement to be adopted should depend upon the importance of the wheat crop on the farm in question and the time and facilities at the disposal of the farmer. Every farmer should at least use clean, plump, heavy seed of the best-adapted variety that he can obtain.

Wheat can be improved in yield and in other desirable characters by the selection of good heads or good plants from the general field and growing the seed from each individual head or plant in separate rows. At harvest time the best rows are thrashed and preserved separately and each lot thus obtained is sown again in separate rows

of suitable length. This is continued year after year until a few superior strains are obtained, which may be rapidly increased in larger plats.

A method of purifying a variety and sometimes of increasing yield is one which may be called "mass selection." No great amount of time or extra labor is required by this method to secure satisfactory results. In applying it, a field of wheat is examined at harvest time and enough good heads of the desired type are selected to make a bushel or more of seed. This is thrashed separately and sown in the ordinary way in a field or plat of good fertility. It may be sown in a marked portion of a general wheat field. At harvest time the best heads are picked from the plat sown with the special seed, just as they were picked from the general field the year before, and these heads are handled and sown as were those selected the previous year. The remainder of the plat is cut and thrashed separately, and the grain thus obtained is used as seed for the general crop. This method of selection should be continued year after year as a means of providing good seed of uniform type for the general wheat crop on the farm.

THE GROUPING OF ADAPTED VARIETIES OF WHEAT.

The wheats recommended in this bulletin are grouped below in accordance with some of the most obvious and most easily determined characters. The terms used in the description are red, white, and amber—to denote the color of the wheat kernels; bearded and beardless—to denote the presence or absence of beards on the heads; white or yellow and red or brown—to denote the color of the chaff (no attempt being made to distinguish white from yellow or red from brown); and velvet and smooth—to denote the presence or absence of hairs or velvet covering on the chaff. The following classification is made according to the descriptions most commonly given of the different varieties:

(1) Red kernels, beardless, smooth white or yellow chaff.

Hard spring.—Fife (Minnesota No. 163), Marquis.

Soft or semihard winter.—Alabama Bluestem (Alabama Bluestem, Alabama Red, Georgia Bluestem, Georgia Red, and Purple Straw are apparently different names for the same variety), Alabama Red, Fultz (Hickman and Jersey Fultz are other names for this variety), Fultzo-Mediterranean (known also as Economy, New Columbia, Squarehead, and Four-Rowed Fultz), Georgia Bluestem, Georgia Red, Harvest Queen (sometimes known as Red Cross), Hickman, Jersey Fultz, Leap Prolific, Ontario Wonder, Prosperity (other names are American Bronze and Number 8), Purple Straw, Red May,[4] Trumbull, Zimmerman.

[4] A red or brown chaffed strain is also grown.

(2) Red kernels, beardless, smooth red or brown chaff.
Soft or semihard winter.—Beechwood, California Red, China (known also as Pennsylvania Bluestem), Currell Prolific, Early Red Clawson, Early Ripe, German Emperor,[5] Golden Chaff, Harvest King, Michigan Amber (Michigan Amber, Michigan Wonder, Early Ripe, and one strain of Red May are apparently the same variety), Michigan Wonder, Perfection, Poole, Portage, Red Prolific, Red Russian, Red Wave, Rochester Red, Wheedling.

(3) Red kernels, beardless, velvet white or yellow chaff.
Hard spring.—Bolton Bluestem, Haynes Bluestem, Minnesota No. 169 (selection from Haynes Bluestem).
Soft or semihard winter.—Mealy, Jones Winter Fife.

(4) Red kernels, beardless, velvet red or brown chaff.
Soft or semihard winter.—St. Louis Grand Prize.

(5) Red kernels, bearded, smooth white or yellow chaff.
Soft or semihard winter.—Auburn Red, Bearded Purple Straw, Budapest, Dietz (or Dietz Longberry), Egyptian Amber, Farmers Friend, Fulcaster, Gladden, Grains o' Gold, Gipsy, Ironclad, Kansas Mortgage Lifter, Lebanon, Mammoth Red, Marvelous,[6] Nigger, Red Wonder,[7] Reliable, Rudy, Sibley New Golden, Stoner,[6] Turkish Amber, Valley, Winter King.
Hard winter.—Beloglina, Crimean, Kanred, Kharkof, Malakof, Turkey.
Hard spring.—Early Java, Preston (known also as Velvet Chaff and Johnson).

(6) Red kernels, bearded, smooth red or brown chaff.
Soft or semihard winter.—Blue Ridge, Diehl Mediterranean, Farmers Trust, Lancaster, Mediterranean, Missouri Bluestem, Red Rock, Shepherd Perfection.

(7) Red kernels, bearded, velvet white or yellow chaff.
Soft or semihard winter.—Rural New Yorker No. 57, Virginia.

(8) Red kernels, bearded, velvet red or brown chaff.
Soft or semihard winter.—Velvet Chaff.

(9) White or amber kernels, beardless, smooth white or yellow chaff.
Soft winter.—Early Ontario, Kentucky Bluestem.

(10) White or amber kernels, beardless, smooth red or brown chaff.
Soft winter.—American Banner, Early Windsor, Dawson Golden Chaff, Gold Coin (apparently the same as American Banner, Fortyfold, Klondike, or Number 6), Plymouth Rock.

(11) White or amber kernels, bearded, smooth white or yellow chaff.
Soft winter.—Seneca Chief.

(12) White or amber kernels, bearded, smooth red or brown chaff.
Soft winter.—Early Genesee Giant, Jones Longberry No. 1.

(13) White or amber kernels, bearded, velvet white or yellow chaff.
Soft winter.—Bearded Winter Fife.

---

[5] A white-chaffed strain is also grown.
[6] See footnote on page 8.
[7] A red-chaffed strain is also grown.

○